

*Chapter 3.0*

---

# Alternatives

### 3.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

---

#### 3.1 INTRODUCTION

Three types of alternatives exist for the Diamond Chuitna **Coal** Project: 1) alternatives that are available to the applicant (action alternatives); 2) alternatives that are available to the agencies which must act upon the applicant's various permit applications (agency alternatives); and 3) the No Action Alternative.

A description of the process of identifying and comparing the action alternatives and selecting the preferred alternatives constitutes the bulk of this chapter. The process is designed to avoid significant adverse project impacts. Identification of agency alternatives, which largely involves minimization of unavoidable adverse impacts is summarized in this chapter; mitigation is detailed in Chapter 6.0. The No **Action** Alternative is discussed in this chapter.

#### 3.2 ALTERNATIVES AVAILABLE TO THE APPLICANT

Identifying and comparing the alternatives available to the applicant (action alternatives) and selecting the preferred alternative is a process of systematically and rationally reducing a large number of options to a smaller number that ultimately represents the alternative with the fewest adverse impacts. It begins with the EIS scoping process which identified the range of options and then proceeds through screening and analysis stages as described below until the preferred alternative is identified.

##### 3.2.1 Options Initially Considered

The EIS scoping process, described in Chapter 7.0, established important cornerstones for this EIS. First, it identified 10 issues of major concern to be addressed during the EIS process. These issues are described in Section 1.4 and were the bases for ultimately determining the action alternatives. Second, to address the 10 issues, the scoping process identified a full range of options for the project components (Table 3-1). The initial options considered the major technical, environmental, and economic issues associated with the project. These initial options are described below.

Thirty-one options were identified for the 12 project components (Table 3-1). One component, the mine, had only one option since the coal deposit, and therefore the mine location, was fixed. A second component, the mine service

Table 3-1

COMPONENT OPTIONS IDENTIFIED DURING THE SCOPING PROCESS

---

| <u>Component</u>              | <u>Option</u>  |
|-------------------------------|--|
| Mine Location                 | Fixed  |
| Overburden Stockpile Location | North of mining limit<br>Center<br>Northeast<br>Southeast  |
| Mine Service Area Location    | Fixed  |
| Transportation System         |  |
| o Corridor/port Location      | Northern/Ladd<br>Eastern/Ladd<br>Southeastern/North Foreland<br>Southern/Granite Point                 |
| o Mode                        | Pneumo-train<br>Coarse coal-water slurry<br>Coal-carbon dioxide slurry<br>Road<br>Railroad<br>Conveyor |
| Loading Facility              |  |
| o Type                        | Filled causeway<br>Elevated trestle  |
| o Length                      | Short<br>Long  |
| Housing                       |  |
| o Location                    | Nikolai<br>Congahbuna<br>Lone Creek<br>Threemile Creek   |
| o Type                        | Townsite<br>Single status  |
| Airstrip                      | Existing<br>New  |
| Water Supply                  | Surface impoundments<br>Wells  |
| Power Supply                  | Purchase power from<br>Chugach Electric Association  |

---

area (Fig. 3-1), was also relatively fixed because of its dependence upon the mine location and because it would be located at the approximate center of the three logical mining units within the lease area, thus allowing its use during future development of other coal resources. For a third component, power supply, the only option considered was purchase of power from the existing Chugach Electric Association power plant at nearby Beluga (Fig. 2-1). Since an existing powerline right-of-way from the Beluga Station would intersect each of the transportation corridor options, this option was clearly more environmentally favorable than any on-site generation option.

#### 3.2.1.1 Overburden Stockpile Location

Four locations for the overburden stockpile were identified: north of the mining limit, in the center of the mining limit, northeast, and southeast (Fig. 3-1).

#### 3.2.1.2 Transportation Corridor/Port Location

Four corridor options were identified (northern, eastern, southeastern, and southern) between the mine site and Cook Inlet (Fig. 3-2).

##### Northern/Ladd

This corridor would extend approximately 14.5 km (9 mi) east from the mine service area toward the Beluga airstrip, then turn south southeast for approximately 7 km (4.3 mi) to a port site at Ladd just north of the mouth of the Chuitna River, about 5.6 km (3.5 mi) north northeast of Tyonek.

##### Eastern/Ladd

This corridor would extend approximately 17.6 km (11 mi) east southeast from the mine service area to the same port site at Ladd.

##### Southeastern/North Foreland

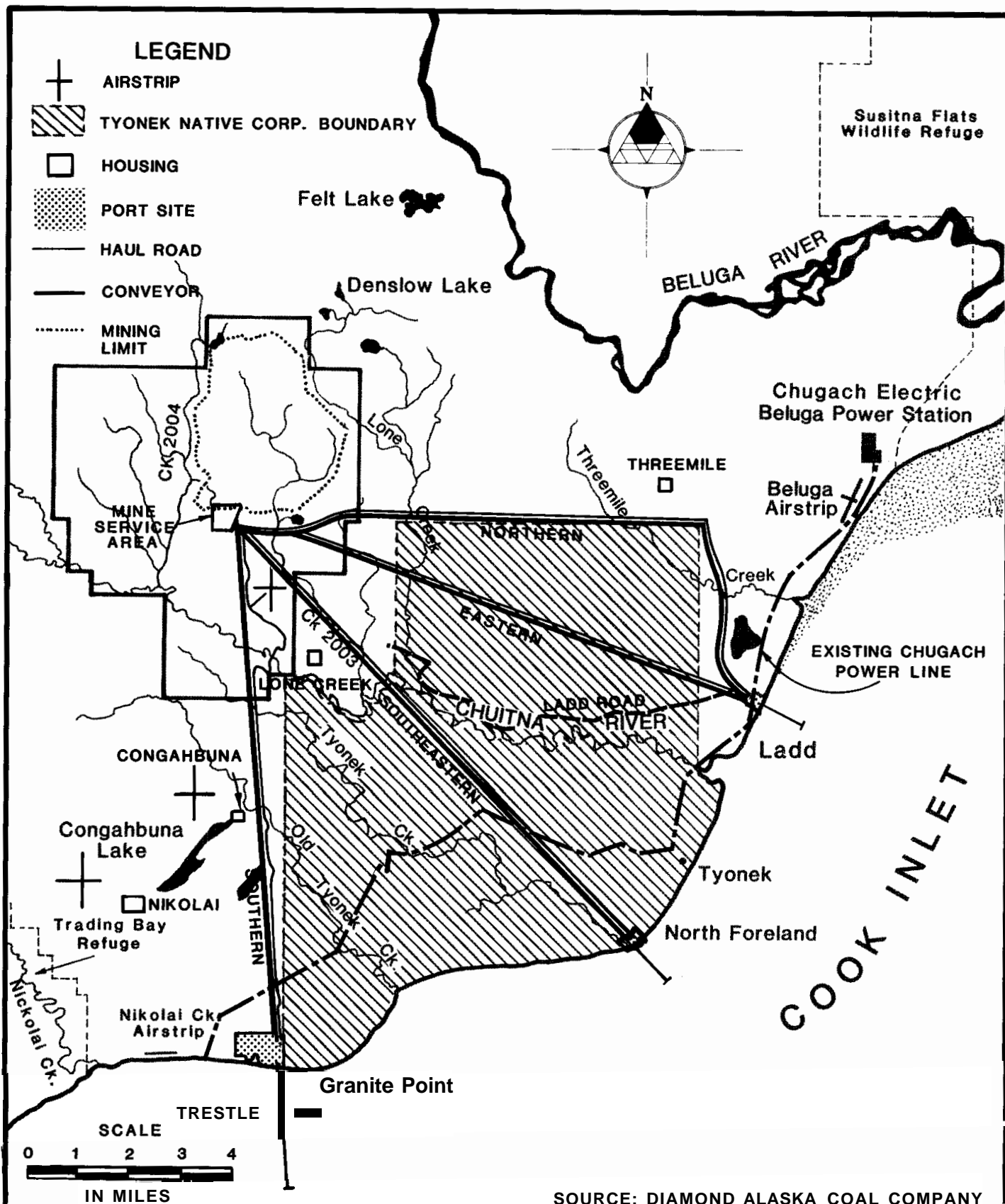
This corridor would extend approximately 18.5 km (11.6 mi) southeast from the mine service area to a port site at the North Foreland, about 2.4 km (1.5 mi) southwest of Tyonek.

##### Southern/Granite Point

This corridor would extend approximately 17.6 km (11 mi) south from the mine service area to a port site at Granite Point, about 14.4 km (9 mi) southwest of Tyonek.

The existing Ladd Road (Fig. 3-2), primarily used in winter for moving heavy equipment in the region, was not considered since its alignment and condition are such that





## INITIAL TRANSPORTATION CORRIDOR, HOUSING AND AIRSTRIP OPTIONS LOCATIONS

Diamond Chuitna Environmental Impact Statement

FIGURE 3-2

it would have to be totally rebuilt with no significant environmental or economic savings.

#### **3.2.1.3 Transportation Mode**

Six options were identified for the method of transporting coal from the mine to the port site.

##### **Pneumo-train**

In this option, open-top, wheeled capsules would be loaded continuously with crushed coal at the mine and propelled down a buried pipeline by compressed air to the port. There the coal would be dumped and the cars returned to the mine via a second pipeline. The coal would be stored at the port for ship loading.

##### **Coarse Coal-Water Slurry**

The coal would be crushed, mixed with water, and pushed through a slurry pipeline to the port. There the coal would be separated from the water, dried, and loaded directly onto ships. The slurry pipeline would operate only when a ship was available for loading, thus eliminating the need for coal storage at the port. Slurry water would be processed and recycled back to the mine in a closed system.

##### **Coal-Carbon Dioxide Slurry**

In this option, coal would be washed, crushed to a fine powder, and dried at the mine site. The powdered coal would be mixed with liquid carbon dioxide (CO<sub>2</sub>) and transported via pipeline to the port. At the port, the CO<sub>2</sub> would be heated and flashed, thus separating the coal for direct loading onto a waiting ship. No coal would be stockpiled at the port. The CO<sub>2</sub> would be recompressed and returned to the mine.

##### **Road**

For this option, the haul road initially built to supply the mine area, which would be used to transport coal to the port for the first years of production, would continue to serve as the transportation mode throughout the life of the project. At full production, approximately twenty-three truck tractors, each hauling two 45.4 Mt (50 ton) uncovered trailers, would make about 311 round trips per day between the mine and the port. Coal would be stockpiled until a ship arrived. This option is not proposed by the applicant.

### Railroad

Crushed coal would be loaded at the mine for transport by rail to the port. Approximately 3.3 round trips per day would be made using 100-car trains over 1.6 km (1 mi) in length. Coal would be unloaded from the heavy duty bottom-dump hopper cars and stockpiled until a ship arrived.

### Conveyor

For this option, coal would be crushed, placed on a single span, covered, conventional belt conveyor, and carried to the port. Coal would be delivered directly to a ship or taken from the conveyor and stockpiled until a ship arrived.

#### 3.2.1.4 Loading Facility Type

Two options for the coal loading facility were identified.

### Filled Causeway

The causeway would be earth-filled and armored with rock. It would support the conveyor and shiploader structures as well as a road for operations and maintenance personnel. The causeway would be used for unloading barges and other fuel and supply ships.

### Elevated Trestle

An elevated, pile-supported approach trestle would support the conveyor and shiploader as well as a narrow roadway for operations and maintenance personnel and equipment. While it would not serve supply barges (there would be a separate barge staging area on the beach), it would support a pipeline to move fuel from tankers or barges to storage tanks at the onshore port area.

#### 3.2.1.5 Loading Facility Length

Both short and long loading facilities for full production were considered for each port location. The options represent the facility lengths necessary to reach water depths that would allow use by either smaller (60,000 dwt) or larger (up to 120,000 dwt) vessels. The smaller vessels would require a berthing depth of about 14 m (46 ft) at mean lower low water (MLLW) while the larger vessels would require between 15.2 to 18.3 m (50 to 60 ft) of depth.

#### 3.2.1.6 Housing Location

Four options for the location of worker housing were identified (Fig. 2-1).



### Nikolai Site

The Nikolai site **is** about **9.6 km** (6 mi) northwest of **Granite** Point and **14.4 km** (9 mi) south of the mine site. The housing area would be located on the edge of the Nikolai escarpment with a southerly exposure overlooking Trading Bay State Game Refuge.

### Conaahbuna Site

The Congahbuna site is immediately northeast of Congahbuna Lake, about **8 km** (5 mi) north of Granite Point and **9.6 km** (6 mi) south of the mine site. This site would be located in the middle of the southern transportation corridor option.

### Lone Creek Site

The Lone Creek site is immediately north of the Chuitna River about **12.8 km** (8 mi) north of Granite Point. It would be west of Lone Creek and about **4.8 km** (3 mi) southeast of the mine site.

### Threemile Site

The Threemile site **is** north of Threemile Creek and south of the Beluga River about **6.4 km** (4 mi) west of the Chugach Electric Association Beluga Power Plant. This site is located just north of the northern corridor.

#### 3.2.1.7 Housing Type

Two options for worker housing were identified.

### Townsite

The **townsite** would have a large proportion of individual houses and apartments for workers and their families. Additional **community** facilities would include schools, hospital, recreation center, religious facilities, town administration offices, police and fire stations, supermarket, and department store. The **townsite** would function as a largely self-contained entity with workers commuting to work daily from their homes as do most workers in Alaska. No transportation to the **townsite** from Anchorage would be provided and workers would live and recreate in and around the townsit.

### Single Status Housing

Single status housing facilities would provide individual rooms for workers in a camp-type housing complex which would include a dining **hall/administration** building, recreation center, laundry, medical facilities, and security and fire services. Minimal emphasis would be placed on

shopping and commercial facilities since the personal needs of the workers, including routine health care, would be served during their off-work, off-site periods. Workers would be flown to the project area from Anchorage and Kenai for their time on the job and then be returned home for their off-work periods.

#### 3.2.1.8 Airstrip

Two options for location of an airstrip were identified: an existing airstrip in the region or a new one in proximity to the housing area.

#### 3.2.1.9 Water Supply

Two options were considered for supplying both the industrial and domestic water needs of the project: surface impoundments and wells.

### 3.2.2 Options Screening Process

The options screening process was conducted in two steps. First, all 31 options identified during the scoping process were initially evaluated to eliminate those options which were clearly unreasonable or infeasible for environmental, technical, or other reasons. In the second step, all remaining options not eliminated in step one were evaluated in greater detail.

#### 3.2.2.1 Initial Options Evaluation

Each of the 31 component options identified during the scoping process was individually reviewed from environmental and technical perspectives. If an option were environmentally and technically reasonable and feasible, it was retained for further analysis. If, however, the option was determined to be unreasonable or infeasible, and if other options retained **for that** component adequately addressed the 10 scoping issues, it was eliminated. Table 3-2 identifies the nine options eliminated during this initial options review, and outlines the major reasons why each was eliminated. Table 3-3 summarizes the results of the initial options evaluation process and shows which options were retained or eliminated.

The elimination of the **southeastern/North** Foreland transportation **corridor/port** location option requires some amplification. The North Foreland port site is located on land owned by TNC and was considered as an option because there is an existing port at the site, including a pier, which was used in the 1970s for loading wood chips aboard vessels for transport to market. An analysis of the pier, as well as tidal currents and ice conditions, was conducted by the applicant (Soros Associates 1986) to determine the feasibility of using the North Foreland site. That study,

Table 3-2

**MAJOR REASONS FOR ELIMINATION OF INDIVIDUAL OPTIONS  
DURING INITIAL OPTIONS EVALUATION**

| <u>Component</u>                             | <u>Option Eliminated</u>            | <u>Major Reasons for Elimination</u>  |
|--|-------------------------------------|---|
| Overburden <b>Stockpile</b>                  | <b>Center</b>                       | <ul style="list-style-type: none"> <li>o Inside mining limit (<b>stockpiled</b> material would have to be rehandled to mine <b>under stockpile</b>)</li> </ul>  |
|  | <b>Northeast</b>                    | <ul style="list-style-type: none"> <li>o Would require a bridge across <b>Lone Creek</b></li> <li>o Visual impacts</li> </ul>   |
| Transportation <b>Corridor/Port Location</b> | <b>Southeastern/ North Foreland</b> | <ul style="list-style-type: none"> <li>o Port site tidal currents and ice <b>conditions</b> prevent ship berthing/loading to full project production capacity</li> </ul>  |
| Transportation Mode                          | <b>Pneumo-train</b>                 | <ul style="list-style-type: none"> <li>o <b>Demonstration</b> plant technology only</li> </ul>  |
|  | Coarse coal-water slurry            | <ul style="list-style-type: none"> <li>o Moderate product degradation (10% BTU loss from water)</li> <li>o Unproven <b>Arctic</b> technology</li> <li>o Spill hazard</li> </ul>   |
|  | <b>Coal-carbon dioxide slurry</b>   | <ul style="list-style-type: none"> <li>o Pilot plant technology <b>only</b></li> <li>o Spill hazard</li> <li>o Final product not presently <b>marketable</b></li> </ul>   |
| Loading Facility                             | Filled <b>causeway</b>              | <ul style="list-style-type: none"> <li>o Large quantities of fill and armor rock required</li> <li>o Constant protection from tidal and ice scour required</li> <li>o Interference with anadromous fish movements and <b>local</b> set net fishery</li> </ul>   |
| Housing Type                                 | <b>Townsite</b>                     | <ul style="list-style-type: none"> <li>o Substantially <b>greater</b> infrastructure required (water, <del>sewer</del>, housing, etc.)</li> <li>o Adverse to local <b>autonomy</b></li> <li>o Less adaptable to traditional <b>regional</b> lifestyles</li> <li>o <b>Competition</b> with subsistence activities</li> <li>o Greater land area impact</li> <li>o Greater impacts on fish and wildlife (increased hunting &amp; fishing; <b>human/wildlife contacts</b>; etc.)</li> </ul> |
| Water <b>Supply</b>                          | Surface impoundments                | <ul style="list-style-type: none"> <li>o Block free-flowing streams</li> <li>o Interference with fish movements</li> <li>o High dams to store water in winter</li> </ul>  |

Table 3-3

OPTIONS ELIMINATED OR RETAINED FOR FURTHER ANALYSIS  
DURING INITIAL OPTIONS EVALUATION

| Component                     | Options Retained  | Options Eliminated   |
|-------------------------------|---|--|
| Mine Location                 | Fixed <sup>1</sup>                                      |  |
| Overburden Stockpile Location | North<br>Southeast                                      | Center<br>Northeast  |
| Mine Service Area             | Fixed <sup>1</sup>                                      |  |
| Transporation System          |   |  |
| o Corridor/Port Location      | Northern/Iadd<br>Eastern/Iadd<br>Southern/Granite Paint | Southeastern/North Foreland  |
| o Mode                        | Road<br>Railroad<br>Conveyor                            | Pneumo-Train<br>Coarse Coal-Water Slurry<br>Coal-Carbon Dioxide Slurry |
| Loading Facility              |   |  |
| o Type                        | Elevated Trestle <sup>1</sup>                           | Filled Causeway  |
| o Length                      | Short<br>Long   |  |
| Housing                       |   |  |
| o Location                    | Nikolai<br>Congahbuna<br>Lone Creek<br>Threemile Creek  |  |
| o Type                        | Single Status <sup>1</sup>                              | Townsite   |
| Airstrip                      | Existing<br>New   |  |
| Water Supply                  | Wells <sup>1</sup>                                      | Surface Impoundments   |
| Power Generation              | Purchase <sup>1</sup>                                   |  |

<sup>1</sup> Sole option remaining for this component

as reviewed by Dames & Moore, showed low ship berthing availability due to tidal currents and ice for any pier located at that site. While berthing availability would probably be adequate to load coal during the lower coal production levels early in the project, serious difficulties and vessel delay could be expected during full coal production levels of 10.9 million Mt (12 million short tons).

The existing pier was also judged inadequate since water depth is not sufficient to accommodate vessels of 72,576 Mt (60,000 dwt) or larger needed at full production. Further, it is misaligned with respect to dominant ebb and flood current direction, it has an inadequate fender system and sedimentation at the berth, and it is structurally inadequate to support a movable type shiploader needed to load ships at full coal production levels.

As a result of the initial options screening, the number of components with only one option to be considered increased to six. Housing type, water supply, and type of loading facility joined the mine location, mine service area location, and power supply as single option components.

#### 3.2.2.2 Remaining Options Evaluation

Since all options in the applicant's Proposed Projects were environmentally and technically reasonable and feasible, each of those options was retained so that the applicant's Proposed Projects would constitute formal alternatives to be analyzed during the analysis of alternatives process. Then, for each component where at least one option other than the applicant's choice remained, all options were individually evaluated from the perspective of each resource or technical discipline (e.g., water quality, subsistence, technical feasibility, etc.). If it was determined that one of the other options was as good as, or better than, the applicant's option on an overall basis, or if it addressed one or more of the 10 scoping issues in a significantly more favorable manner than did the applicant's proposed option, that option was retained for the analysis of alternatives process.

The following discussions summarize the results of these more detailed analyses and describe why an additional seven options and one component were eliminated from consideration. Generally, only those disciplines which would likely have a reasonable difference in impacts between options are discussed.

#### Overburden Stockpile

The two remaining stockpile locations, north and southeast (Fig. 3-1), would have similar impacts on water quality and vegetation, but the north site would be closer

to fish spawning habitat and would be in the southern portion of a fall moose rutting\* area. Also, use of the north site would subject drainage 2004 to project-related disturbance immediately rather than 22 years into the project. The north site would have poorer foundation conditions and would cause greater negative visual impacts than the southeast. On the basis of this analysis, and since it did not address any of the 10 scoping issues more favorably than the southeast site (the applicant's proposed option), the north site was eliminated, leaving the southeast site as the single option for location of the overburden stockpile.

### Transportation Corridor/Port Location

Initial analysis of the three options showed that all were environmentally and technically reasonable and feasible. Because of the complicated nature of a discipline-by-discipline comparison among all three options, and since the northern/Ladd option and the eastern/Ladd option shared the same port site, it was logical to do a comparative analysis between these two options to determine if one option could be eliminated.

To compare these options, a specific set of "options screening criteria<sup>1</sup>" was developed to evaluate potential impacts (Table 3-4). Table 3-5 summarizes the comparative resource discipline analyses for the northern/Ladd and the eastern/Ladd transportation corridor/port site options based upon the options screening criteria in Table 3-4. For each of the 10 disciplines, the potential adverse impacts for each option are shown relative to those for the other option. Generally, only those screening criteria having a reasonable difference in adverse impacts between options are discussed.

Analysis of relative potential for adverse impact to water quality showed that since the eastern/Ladd option would be shorter and make fewer stream crossings, it was considered to have a relatively low potential for adverse impact from sediment production during construction, operation, and reclamation. The northern/Ladd option was judged to have a relatively moderate potential for adverse impact.

From a vegetation standpoint, the longer northern/Ladd option would directly affect more vegetation and wetlands. Indirectly, the northern/Ladd option would potentially impact a greater area of vegetation due to traffic-generated dust. Therefore, the northern/Ladd option was judged to have a relatively moderate potential for impact while the eastern/Ladd option was judged to have a relatively low potential.

Table 3 4

**TRANSPORTATION CORRIDOR/PORT LOCATION INDIVIDUAL  
DISCIPLINE OPTIONS SCREENING CRITERIA**

| <b>Discipline<sup>1</sup></b>   | <b>Options Screening Criteria</b>   |
|---------------------------------|---|
| Water Quality                   | Sediment production <b>from</b> road surfaces, cuts, fills,<br><b>sideslopes</b> and stream crossings<br>Reclamation difficulty<br>Spill Hazard (includes offshore port)  |
| <b>Vegetation</b>               | Direct vegetation loss<br>Indirect loss from dust and vehicle or foot traffic<br>Relative value of wetlands lost  |
| Fish                            | Presence or absence of fish<br>Value in terms of spawning, rearing or migration<br><b>Number</b> of stream crossings  |
| Wildlife                        | Direct habitat loss<br>Indirect habitat loss due to noise, other disturbance or<br>human <b>contacts</b><br>Effects on <b>animal</b> movements  |
| <b>Socioeconomics</b>           | <b>Local</b> resident control of, or input to, project through<br>land <b>ownership</b><br><b>Proximity</b> of port site to <b>Tyonek</b><br><b>Income from</b> corridor and port site leases   |
| Subsistence                     | Interference with access to traditional use <b>areas</b><br>Interference with existing harvest activities<br><b>Changes</b> in resource availability (increased <b>competition</b> ,<br>reduced <b>populations</b> , changes in <b>movement</b> patterns) |
| <b>Recreation</b>               | <b>Impacts</b> on existing recreation   |
| Regional use                    | Flexibility for other regional uses<br>Size and location of <b>component</b> sites adequate for <b>expansion</b><br>Preclusion of other users or uses<br><b>Consolidation</b> with existing facilities  |
| <b>Technical</b><br>Feasibility | Availability of adequate <b>construction</b> technology<br>Relative <b>complexity</b> of design, <b>construction</b> and operation  |
| <b>Reclamation</b>              | <b>Reclamation</b> difficulty   |

<sup>1</sup> Includes only disciplines having a **reasonable** difference in impacts among the options

Table 3-5

COMPARATIVE RESOURCE DISCIPLINE ANALYSIS OF  
RELATIVE POTENTIAL ADVERSE IMPACTS FOR THE **NORTHERN/LADD** AND  
**EASTERN/LADD** TRANSPORTATION **CORRIDOR/PORT** SITE LOCATION OPTIONS

| <u>Discipline</u> <sup>1</sup> | <u>Northern/Ladd</u>    |                 |             | <u>Eastern/Ladd</u> |                 |             |
|--------------------------------|-------------------------|-----------------|-------------|---------------------|-----------------|-------------|
|                                | <u>Low</u> <sup>2</sup> | <u>Moderate</u> | <u>High</u> | <u>Low</u>          | <u>Moderate</u> | <u>High</u> |
| Water Quality                  |                         | M               |             | L                   |                 |             |
| Vegetation                     |                         | M               |             | L                   |                 |             |
| Fish                           |                         | M               |             | L                   |                 |             |
| Wildlife                       |                         |                 | H           |                     | M               |             |
| Socioeconomics                 |                         | M               |             | L                   |                 |             |
| Subsistence                    | L                       |                 |             | L                   |                 |             |
| Recreation                     |                         | M               |             | L                   |                 |             |
| Regional Use                   |                         | M               |             |                     | M               |             |
| Technical Feasibility          | L                       |                 |             | L                   |                 |             |
| <b>Reclamation</b>             |                         | M               |             | L                   |                 |             |

<sup>1</sup> Includes only disciplines having a reasonable difference in adverse impacts between the options.

<sup>2</sup> "High", "moderate", and "low" are comparative among the three corridor options, not absolute values of potential environmental impacts.



Analysis of the relative potential impact to fish showed that the eastern/Ladd option would involve four stream crossings with two crossings being in areas of high fish value. The northern/Ladd option would involve six stream crossings with at least two crossings being in areas of high fish value. Thus, the overall relative potential for adverse impact for the eastern/Ladd option was judged to be low, while that for the northern/Ladd option was judged to be moderate.

From a wildlife perspective, the northern/Ladd option would directly impact about 14 ha (35 ac) more habitat including wetlands and riparian areas important to waterfowl and bears than the eastern/Ladd option. Indirect habitat loss for swan nesting and rearing would be equally high for both options. The northern/Ladd option would pass within 704 m (770 yd) of an eagle nest. Effects upon animal movements for both options would be similarly moderate, but would be reduced by optimizing the locations of specially constructed wildlife crossings. Therefore, the northern/Ladd option was judged to have a relatively high potential for adverse impacts upon wildlife while the eastern/Ladd option was considered to have a relatively moderate potential.

Analysis of the socioeconomic impacts upon residents of Tyonek showed that the eastern/Ladd option would cross lands owned by TNC, thereby giving Tyonek residents some degree of control over project design and location as well as direct income from a corridor right-of-way lease. The northern/Ladd option would not cross any TNC lands. Both options would offer the same benefits of proximity to jobs as well as the disadvantages of the port site being relatively close to the village. Thus, the eastern/Ladd option was judged to have a relatively low potential for adverse impact while the northern/Ladd option was judged to have a moderate potential.

From a subsistence perspective, the potential for adverse impact to residents of Tyonek from either the eastern/Ladd option or the northern/Ladd option was considered to be low since Tyonek residents make relatively little use of lands affected by those options. The level of impact to the small number of residents between the Ladd port site and the Beluga power station is unknown, but would likely not differ significantly between the two options.

Analysis of relative potential impact to recreation showed that the northern/Ladd option crossed more streams than did the eastern/Ladd option, including two crossings of Threemile Creek. The northern/Ladd option would also pass close to Viapan and Tukallah Lakes. Thus, the northern/Ladd option was judged to have a relatively moderate potential for adverse impact while the eastern/Ladd option was judged to have a relatively low potential.

From a regional use perspective, there was no significant difference between the options relating to size or ability to expand to accommodate other users, nor was there a difference in consolidation with existing facilities. Both options would cross private land which might restrict other potential uses in the future. The northern/Ladd option would cross the southern extreme of another state coal lease (Fig. 4-1), thus making development more economically feasible by having a road and conveyor right on the lease. This was not judged, however, to be a significant difference considering the relatively small advantage this would provide to the lease holder. Thus, on an overall regional use basis, both options were considered to have moderate potential for adverse impact.

Analysis of technical feasibility showed adequate construction technology exists for both options, with neither having significant complexity of design, construction, or operation. Thus, both options were judged to have a relatively low potential for adverse impacts.

From a reclamation perspective, the northern/Ladd option, with its greater length and acreage of wetlands and higher number of stream crossings, was considered to be more difficult to reclaim. Thus, the eastern/Ladd option was judged to have a relatively low potential for adverse impacts while the northern/Ladd option was judged to have a moderate potential.

Overall analysis of the 10 resource disciplines for the two transportation corridor/port site options showed (Table 3-5) that the eastern/Ladd option clearly had a lower overall potential for adverse impacts than did the northern/Ladd option. The eastern/Ladd option was judged to have a low potential for adverse impacts for eight of the 10 disciplines with none rated as having a high potential, while the northern/Ladd option was judged to have a low potential for impacts for only two disciplines and rated as having a high potential for one.

In final analysis, the eastern/Ladd option was judged preferable to the northern/Ladd option. However, despite its rating, the northern/Ladd option was not eliminated because most potential impacts could be mitigated by proper siting and design of facilities. Therefore, both options were retained and specifically addressed in the comparison of action alternatives process.

#### Transportation Mode

Table 3-6 summarizes the resource discipline analysis of the three remaining transportation modes for moving coal from the mine to the port: road, railroad, and conveyor (the applicant's proposed option).

Table 3-6

RESOURCE DISCIPLINE ANALYSES OF THE RELATIVE  
POTENTIAL ADVERSE IMPACTS OF TRANSPORTATION MODE OPTIONS

| <u>Discipline</u> <sup>1</sup> | Mode                    |                 |                 |            |                 |             |
|--------------------------------|-------------------------|-----------------|-----------------|------------|-----------------|-------------|
|                                | Road                    |                 | Railroad        |            | Conveyor        |             |
|                                | <u>Low</u> <sup>2</sup> | <u>Moderate</u> | <u>Moderate</u> | <u>Low</u> | <u>Moderate</u> | <u>High</u> |
| Water Quality                  |                         |                 | H L             |            | L               |             |
| Air Quality                    |                         |                 | H M             |            | L               |             |
| Vegetation                     | L                       |                 |                 | H          |                 | H           |
| Fish                           |                         | M               | L               |            | L               |             |
| Wildlife                       |                         |                 | H M             |            | L               |             |
| Subsistence                    |                         | M               |                 | H          |                 | H           |
| Visual                         |                         |                 | H M             |            | M               |             |
| Noise                          |                         |                 | H M             |            | L               |             |
| Recreation                     |                         |                 | H M             |            | L               |             |
| Economics                      |                         | M               |                 | H L        |                 |             |
| Reclamation                    | L                       |                 |                 | H          | M               |             |
| Regional Use                   |                         | M               | L               |            | M               |             |

<sup>1</sup> Includes only disciplines having a reasonable difference in adverse impacts among the options.

<sup>2</sup> "High", "moderate", and "low" are comparative among the three corridor options, not absolute values of potential **environmental** impacts.

For each discipline, the potential adverse impacts for each option are shown relative to the potential impacts for the other two options. For the road option, it is important to keep in mind that a road from the port to the mine would still exist in any event, *i.e.*, the road would be there whether or not another coal transportation mode was constructed. Therefore, cumulative adverse impacts were considered for construction of the other transportation modes. For example, the road would have a lower adverse impact than the railroad or conveyor on vegetation because their construction would destroy additional vegetation, while use of the existing road to haul the coal would cause no additional vegetation destruction (assuming adequate dust control measures). The following discussion addresses only resource discipline analyses which showed a reasonable difference in adverse impacts among the options.

Because of the high level of truck traffic necessary to transport the coal by road at full production (approximately 331 round trips per day), erosion problems, hence potential adverse water quality impacts, would be significantly greater than for either the railroad or conveyor options, both of which were rated as relatively low.

By the same reasoning, the road option rated high for potential adverse air quality impacts. The railroad, which would generate a diesel smoke plume and some dust, was rated as moderate. The conveyor option was rated as low.

From a vegetation perspective, the road option rated relatively low since the road would already exist and only moderate additional vegetation destruction would occur if it continued to be used to haul coal throughout the life of the project. Potential adverse railroad impacts were rated as relatively high due to the necessity to clear and maintain another right-of-way. Although the conveyor itself would sit on elevated supports, it would need an adjacent service road throughout its length which would also require clearing and maintenance of another right-of-way. The conveyor option was also rated as having a relatively high potential for adverse impacts to vegetation.

The greater potential adverse water quality impacts identified for the road option, discussed above, resulted in a relatively moderate rating for potential adverse fish impacts while the railroad and conveyor options were rated as relatively low for this discipline.

From a wildlife perspective, the road option possesses a relatively high level of potential for adverse impacts because of disturbance from noise and vehicle movements associated with the 311 round trips per day (an average of one truck with two trailers passing a given point every 2 minutes, 22 hours per day, 362 days per year). Also, deep snow in winter would cause moose to use the cleared road to

move about, resulting in more frequent vehicle/moose collisions. The railroad option would generate substantially less noise and movement on a continuous basis than would the road, but it would have the same problems with moose collisions in winter. It was rated as having a relatively moderate potential for adverse impact. The conveyor would be stationary and would generate significantly less noise. Its main potential adverse impact would be physical blockage of animal movements, a problem not associated with either the road or railroad. Since large animal crossings would be designed into the conveyor option, it was rated as having a relatively low potential for adverse impact.

The road and railroad would potentially have direct adverse impacts upon subsistence resources. The moose population, especially, would be expected to be adversely affected as a result of collisions with vehicles. The railroad and conveyor could also have direct impacts upon subsistence use because they could physically block access across the transportation corridor. With the conveyor generally elevated only 0.6 m (2 ft) above the ground (with no clearance in winter due to snow), traditional winter travel across the corridor could be limited to the road and large animal crossings. The railroad right-of-way could pose a similar though less formidable obstacle, especially to snow machines. Thus, the road was considered to have a relatively moderate potential for adverse impacts on subsistence while the railroad and the conveyor were considered to have relatively high potential for adverse impacts.

Visually, the road, with its frequent truck traffic and associated dust, was judged to have a relatively high level of potential for adverse impact. The railroad, with its 5.5 m (18 ft) high engines and 1.6 km (1 mi) long trains was judged to have a relatively moderate level of potential for adverse impact. The conveyor would be stationary and stand about 2.7 m (9 ft) above the ground and was also judged to have a relatively moderate level of potential for adverse impacts.

The road option was determined to have a relatively high potential for adverse impacts from noise associated with truck traffic. The railroad was judged to have a moderate relative potential impact for noise, while the conveyor was determined to have a relatively low potential impact.

From a recreation perspective, noise and visual considerations (including dust) were the primary factors used to determine effects upon the quality of the recreation experience. On that basis, the road was determined to have a relatively high potential for adverse impact while the railroad was judged to have a relatively moderate potential.

The conveyor, with its stationary nature and lower noise level, was judged to have a relatively low level of potential impact.

On the basis of initial capital as well as operation and maintenance costs, the road option was judged to be of moderate overall economic impact while the railroad was determined as having a relatively high economic impact. The conveyor was judged to have an overall relatively low economic impact.

From a reclamation perspective, the road, which would exist in any event, was considered to have a relatively low potential for adverse impacts. The railroad was judged to have a relatively high potential impact because of the necessity to reclaim the greater cuts and fills necessary to maintain grade and to remove the large bridge across the Chuitna River if the southern corridor option were selected. The conveyor, which would largely be elevated above the ground on pilings, was considered to have a relatively moderate potential for adverse impacts from reclamation.

The railroad seemed to possess some possible advantage over the other two options when considering future regional uses. The road option would exist for other potential users regardless of which other coal transportation mode was built. The conveyor system would be sized for the output of the Diamond Chuitna project only. If another coal development commenced operations during the life of the Diamond Chuitna project or if another large development occurred after the coal mine was terminated, the conveyor system would not have the capacity or geographic flexibility to handle additional coal. The railroad option could provide some advantage for another coal development project favorably located with respect to the right-of-way. However, another project of similar size to the Diamond Chuitna project would probably have to substantially upgrade the size of any existing railroad system to meet its needs. Thus, both the road and the conveyor options were judged to have a relatively high potential for adverse impacts from a regional perspective (i.e., both would have no significant positive effect on promoting a regional coal transportation system), while the railroad was judged to have a relatively moderate level of adverse impacts.

Overall analysis of the three options (Table 3-6) clearly showed that the conveyor option had the lowest levels of relative adverse impacts for the twelve disciplines considered. The conveyor option showed relatively high potential for adverse impacts for only three disciplines: vegetation, subsistence and regional perspective. The relative differences among the three options for potential impacts to vegetation were not judged to be significant. The relatively high adverse impact

rating for the regional use discipline was also judged not to be significant because it merely means that the conveyor would not have a positive effect on promoting a regional coal transportation system, but it would not in any way preclude such a system from being developed in the future.

The one major discipline concern for the conveyor was the relatively high potential impact of blocking access to traditional subsistence use areas if the southern corridor/Granite Point option were selected. This concern could be addressed by providing enough crossings to permit subsistence users reasonable access to traditional use areas. It was felt that this potential problem could be adequately handled in the design of that option, and thus the conveyor system (the applicant's proposed option) was judged the best overall transportation mode option for addressing the 10 scoping issues.

#### Loading Facility Length

Both full production options identified, i.e., a short trestle and a long trestle, were dependent upon vessel draft and water depth. The greatest difference between these options would occur at the Granite Point port site where the shorter trestle would be approximately 2,277 m (7,470 ft) and the longer trestle 3,810 m (12,500 ft). Analysis showed only three areas where a reasonable difference between the options would exist. Visually, the longer facility would have a greater adverse impact. It would also require somewhat greater travel time for a larger boat moving along the coast to pass around it. Smaller boats, which make up the majority of existing use, could sail through the 122 m (400 ft) openings between the trestle supports. From a regional use perspective, however, the longer facility could be considered more favorable because of its increased flexibility for other potential users. None of these three differences was considered significant and neither option addressed any of the 10 scoping issues in a significantly more favorable manner than the other. Thus, it was judged that length of the loading facility was not of significant importance and it was dropped as a component.

#### Housing Location

Initial analysis of the four housing location options, Nikolai, Congahbuna, Lone Creek (the applicant's proposed option), and Threemile, showed that three of the four sites were corridor specific (Fig. 3-2). Lone Creek was the only option which could be used regardless of which transportation corridor was selected. Both the Nikolai and Congahbuna sites are located well south of the mine area near Granite Point and would be practical only if the southern corridor were selected. The Threemile site is just north of the northern corridor near the Beluga power station and would be practical only if the northern corridor were

selected. Since all four sites had already been determined to be environmentally and technically reasonable and feasible, it was decided to retain each corridor-specific option for alternative analysis with its respective corridor. This was predicated on the assumption that the option was the best one for that corridor and that it addressed at least one scoping issue more favorably than did the Lone Creek site. The Lone Creek site would be retained in any event because it is the applicant's proposed option and it is not corridor specific.

Analysis of the Nikolai and Congahbuna options showed that they are within 4.8 km (3 mi) of each other and have many similarities. Because the two sites are so similar, it appeared most logical to compare them to one another to select the more favorable for retention.

Although the Nikolai and Congahbuna sites showed few significant differences among potential adverse resource discipline impacts, the Nikolai site was considered to have more potential for adverse impacts upon both fish and wildlife because it is closer to Nikolai Creek and Trading Bay Refuge. Also, Nikolai would have a greater adverse visual impact because it would be located apart from the conveyor and the haul road whereas Congahbuna would be in the transportation corridor immediately adjacent to the conveyor and haul road. The Nikolai site, being further from the mine site, would also increase the daily cost of transporting the majority of workers to their work stations. From the subsistence perspective, however, there does not appear to be much use of the Nikolai site by local residents while the area in the vicinity of Congahbuna Lake receives some use for hunting, picnicking, and berry picking. Taking all potential impacts into account, the Congahbuna site collectively was judged to be more favorable than the Nikolai site.

A further- analysis between the Lone Creek and Congahbuna housing site options showed that the Congahbuna option addressed at least two scoping issues (fish and socioeconomics) in a significantly more favorable manner than did the Lone Creek option. Therefore, the Congahbuna option was retained for alternatives analysis.

Analysis of the Threemile housing site showed this option addressed at least one scoping issue (regional use) in a more favorable manner than did the Lone Creek option. Therefore, the Threemile option was retained for the alternative analysis process.

#### Airstrip Location

Two options were identified for locating the airstrip to be used to shuttle workers between the project area and their homes in Anchorage and on the Kenai Peninsula: use of



a presently existing airstrip in the vicinity of the project area or construction of a new airstrip adjacent to the housing site ultimately selected. The latter is the applicant's preferred option.

Using an existing airstrip would offer the advantages of lower capital costs for construction and less environmental impact at the site of the proposed new airstrip. Disadvantages would include: the possible need to construct additional roads and bridges to access an existing strip; greater operational costs and environmental impacts from transporting workers and equipment significantly greater distances; the necessity to substantially upgrade an existing airstrip; and the possibility of more marginal operating conditions because the existing runway alignment might not be optimum. Other disadvantages related to the operation of an existing airstrip at greater distances from the housing site would include the need to construct larger terminal facilities to shelter workers waiting for planes, the increased risk and liability from unauthorized use of a previously public airstrip by private pilots, hunters or fishermen, and vandalism.

On a more site-specific basis, all currently usable airstrips in the vicinity of the project area which might be upgraded to handle traffic needs for the Diamond Chuitna Project are private. Thus, their availability for use by the project would be uncertain. The major airstrips (Beluga, Tyonek, and Nikolai Creek) would be located approximately 19.2 to 28.8 km (12 to 18 mi) from the mine site. While the Beluga airstrip is presently capable of handling the traffic needs of the project, Tyonek and Nikolai Creek are not. They both would require lengthening and construction of a cross runway. This would probably not be possible at Nikolai Creek because of space limitations and the substantial adverse wetlands impacts which would occur. Whether residents of Tyonek would consent to a major upgrading and operation of a busier airstrip immediately adjacent to the village is doubtful.

Other airstrips in the vicinity are mostly smaller ones built to support short term oil and gas drilling operations. Some are presently useable by small aircraft, but all would require substantial upgrading and construction of a cross runway before being capable of supporting the project's operational needs. From a strictly geographical standpoint, the "Pan Am" airstrip, located only 0.6 km (0.4 mi) east of the Lone Creek housing site, would appear to be the most logical location because it would be close to the mine site. However, its location on the bluff above stream 2003 would prevent it from being upgraded to sufficient size.

On the basis of the advantages and disadvantages discussed above, it was judged that use of an existing airstrip in the vicinity of the project area, as opposed

to construction of a new airstrip immediately adjacent to the housing site, would not address any of the 10 issues in a significantly more favorable manner. This option was therefore eliminated.

At the completion of the options screening process, a total of one component and 15 options had been eliminated. The options that were retained and used to form the action alternatives are shown in Table 3-7.

### **3.2.3 Identification and Description of Action Alternatives**

The options screening process left only two components with more than one option remaining: the transportation corridor/port site location and the housing site location. The applicant wishes to retain two transportation corridor/port site options (southern/Granite Point and northern/Ladd). Two alternatives using these options were identified as the applicant's Proposed Project. The applicant's proposal entails development of only one of these transportation corridors and associated port site. A third alternative, using the eastern/Ladd option, is also discussed. Finally, two housing/airstrip options other than the applicant's proposed option at Lone Creek were identified. The following sections describe the action alternatives that have been selected for detailed consideration in this EIS. Table 3-8 presents a matrix showing which components are included in each alternative.

#### **3.2.3.1 Southern/Granite Point Alternative**

In addition to the fixed mine and mine service area locations, this alternative would site the overburden stockpile southeast of the mining limit. It includes a conveyor system within the southern transportation corridor to the site at Granite Point (Figs. 2-1 and 3-1). The port coal-loading facility would be an elevated trestle. A single-status housing facility with associated new airstrip would be located at the Lone Creek site. Water would be supplied by wells and power would be purchased from the Chugach Electric Association natural gas power station at Beluga.

#### **3.2.3.2 Northern/Ladd Alternative**

This alternative is the same as the southern/Granite Point alternative except the northern transportation corridor to a port site at Ladd would be used (Fig. 2-1).

Table 3-7

OPTIONS USED TO FORM ALTERNATIVES

| Component                     | Option(~)  |
|-------------------------------|--|
| Mine Location                 | Fixed  |
| Overburden Stockpile Location | Southeast  |
| Mine Service Area             | Fixed  |
| Transportation System         |  |
| o Corridor Location           | <b>Southern/Granite Point</b><br><b>Northern/Ladd</b><br><b>Eastern/Ladd</b> |
| o Mode                        | Conveyor   |
| Loading Facility              | Elevated Trestle   |
| Housing                       |  |
| o Location                    | Lone Creek<br>Congahbuna<br><b>Threemile Creek</b>                           |
| o Type                        | Single Status  |
| Airstrip                      | New  |
| Water Supply                  | <b>Wells</b>   |
| Power <b>Generation</b>       | Purchase   |

### 3.2.3.3 Eastern/Ladd Alternative

This alternative would be the same as the northern/Ladd alternative except that the eastern corridor to a port site at Ladd would be used (Fig. 2-1).

### 3.2.3.4 Housing/Airstrip Options

#### Conaahbuna Housing/Airstrip Option

This option would be substituted for the Lone Creek housing/airstrip site in the southern/Granite Point alternative with the housing area and the airstrip being located at the Congahbuna site (Fig. 2-1).

#### Threemile Housing/Airstrip Option

This option would be substituted for the Lone Creek housing/airstrip site in the northern/Ladd alternative with the housing area and the airstrip being located at the Threemile site (Fig. 2-1).

### 3.2.4 Comparison of Action Alternatives

The three action alternatives were compared to determine the preferred alternative. The Congahbuna and Threemile housing/airstrip options were then compared with the Lone Creek option to determine whether either option provided a significant advantage over the Lone Creek site such that it could substitute for the Lone Creek option in one or more of the alternatives. The analytical basis for the comparisons in this section is provided in the detailed impact discussions in Chapter 5.0. The reader is encouraged to consult Chapter 5.0 for more extensive examination of the major issues.

Evaluation criteria based on the ten issues identified during scoping (Section 1.4) were developed to compare the three action alternatives and the housing options. The criteria are shown in the first column of Table 3-9. For each scenario, the evaluation criteria were applied separately to each alternative to determine the relative values for the total potential impacts for that alternative. It is important to note that the "relative total impact value" assigned to a given alternative for a specific criterion was derived only by evaluation of that alternative relative to the other alternatives for that scenario. The relative values used were low, moderate, and high.

For example, using the third evaluation criterion (Table 3-9), i.e., "Minimize impacts to wildlife and wildlife habitats," each alternative was analyzed from the standpoint of its total potential for impacts to wildlife and wildlife

Table 3-8

## DIAMOND CHUITNA PROJECT ACTION ALTERNATIVES

| Project Components and Options             | Action Alternatives              |                           |                          |
|--|----------------------------------|---------------------------|--------------------------|
|  | <u>Southern/<br/>Granite Pt.</u> | <u>Northern/<br/>Ladd</u> | <u>Eastern/<br/>Ladd</u> |
| Mine Location* - Fixed                     | X                                | X                         | X                        |
| Overburden Stockpile Location* - Southeast | X                                | X                         | X                        |
| Mine Service Area* - South of Mining Limit | X                                | X                         | X                        |
| Transportation                             |                                  |                           |                          |
| a) Corridor/Portsite                       |                                  |                           |                          |
| 1. Southern/Granite Point                  | X                                |                           |                          |
| 2. Northern/Ladd                           |                                  | X                         |                          |
| 3. Eastern/Ladd                            |                                  |                           | X                        |
| b) Mode* - Conveyor                        | X                                | X                         | X                        |
| Loading Facility* - Trestle                | X                                | X                         | X                        |
| Worker Housing                             |                                  |                           |                          |
| a) Location                                |                                  |                           |                          |
| 1. Lone Creek                              | X                                | X                         | X                        |
| 2. Congahbuna                              |                                  |                           |                          |
| 3. Threemile                               |                                  |                           |                          |
| b) Type* - Single Status                   | X                                | X                         | X                        |
| Airstrip* - New Construction               | X                                | X                         | X                        |
| Water Supply* - Wells                      | X                                | X                         | X                        |
| Power Generation* - Purchase Gas           | X                                | X                         | X                        |

\*Components with only one option.

habitat and a relative value (compared to the other two alternatives) was assigned. Only significant differences in potential impacts were considered. Thus the southern/Granite Point alternative had a relatively moderate value for total potential wildlife and wildlife habitat impacts compared to the northern/Ladd and eastern/Ladd alternatives which had relative values of high and low, respectively. Table 3-9 summarizes the relative total impact values for each evaluation criterion. This allows a consistent comparison of alternatives to be made.

It must be emphasized that while a particular alternative might be assigned a high relative total impact value when compared with the other alternatives, it does not necessarily mean that the alternative would have a high absolute impact. In this chapter, therefore, alternatives were assigned a total impact value relative to one another while the actual significance of the alternatives' impacts are described in Chapter 5.0.

Analysis showed that, because of the specific nature of the project and the make-up of the action alternatives, most of the significant potential impacts were associated directly with activities at the mine and that there were relatively few significant differences in potential impacts among the other project components. Since all impacts associated directly with the mine and its attendant operations were common to all alternatives, the comparison of alternatives process addresses only potential impacts associated with the components of the project other than the mine. The locations of the transportation corridor, port site, and the housing and airstrip sites were the only components creating significant differences in potential impacts among alternatives.

### Water Quality

Potential water quality impacts were evaluated primarily on the basis of the risk of petroleum product spills and sediment production from road surfaces, pads, cuts, fills, and stream crossings. No significant differences in potential impacts were identified between the southern/ Granite Point and northern/Ladd alternatives. The eastern/ Ladd alternative would have fewer potential impacts since it would be shorter and cross no major streams as would the southern/Granite Point alternative. It would also cross flatter terrain than either of the others. Therefore, the southern/Granite Point and northern/Ladd alternatives were assigned moderate relative total impacts values for water quality while the eastern/Ladd alternative was assigned a low value.

Table 3-9

EVALUATION CRITERIA MATRIX SHOWING RELATIVE' TOTAL IMPACT  
VALUES ASSIGNED TO THE THREE ACTION ALTERNATIVES

| Evaluation<br>Criteria   | Southern/<br>Granite Pt. | Northern/<br><b>Ladd</b> | Eastern/<br>Ladd |
|--|--------------------------|--------------------------|------------------|
| 1. Minimize risk of water<br>quality degradation and<br>alteration to flows  | Moderate                 | Moderate                 | Low              |
| 2. Minimize impacts to<br>fish and fish habitat                              | Moderate                 | Moderate                 | Low              |
| 3. Minimize impacts to<br>wildlife and wildlife<br>habitats                  | Moderate                 | High                     | Low              |
| 4. Minimize potential<br>reclamation problems                                | Low                      | Low                      | Low              |
| 5. Minimize impacts to set<br>net fishery                                    | Moderate                 | High                     | High             |
| 6. Minimize impacts to<br>traditional subsistence<br>harvest activities      | High                     | Low                      | Low              |
| 7. Minimize social, cultural,<br>and economic impact upon<br>local residents | Moderate                 | Moderate                 | Low              |
| 8. Minimize cumulative<br>regional use impacts                               | Low                      | Moderate                 | Moderate         |
| 9. Minimize technical<br>complexity  | Low                      | Low                      | Low              |
| 10. Minimize cost  | No Data                  | No Data                  | No Data          |

' **"High"**, "moderate", and "low" are comparative among the three corridor options, not absolute values of potential environmental impacts.

### Fish

Potential impacts to fish and fish habitat were evaluated primarily on the basis of the presence or absence of fish, the number of stream crossings, and the value of potentially affected streams for fish spawning, rearing or migration.

No significant differences in potential impacts were identified between the southern/Granite Point and northern/Ladd alternatives. The eastern/Ladd alternative would have fewer potential impacts since it would cross fewer streams than the northern/Ladd alternative and would cross no major streams as would the southern/Granite Point alternative. It would also impact fewer lakes than either of the other alternatives. Therefore, the southern/Granite Point and northern/Ladd alternatives were assigned moderate relative total impact values for fish while the eastern/Ladd alternative was assigned a lower value.

### Wildlife

Potential impacts upon wildlife were evaluated primarily on the basis of direct and indirect habitat loss since potential impacts arising from interference with movements across the corridors could be largely mitigated by proper design, construction, and operation of animal crossings.

The northern/Ladd alternative was considered to have greater potential impacts than either of the others because it is longer and would cross riparian habitat important to brown bears feeding upon salmon. The southern/Granite Point and northern/Ladd alternatives would have similar impacts to wetlands important to wildlife, but the eastern/Ladd alternative would cross fewer important wetlands than either of them. The eastern/Ladd alternative, unlike the other two alternatives, would also avoid eagle nests. Thus, the eastern/Ladd alternative was assigned a low relative total impact value while the southern/Granite Point and northern/Ladd alternatives were assigned values of moderate and high, respectively.

### Reclamation

Essentially all of the major reclamation concerns identified during the scoping process were focused on the mine and its surrounding area. Technology for successful reclamation of the other project components exists and has been demonstrated to be effective for other Alaska projects. Since reclamation procedures that would be used at the mine and its surrounding area would be common to all three alternatives, no significant differences were identified among the three alternatives for this criterion and all were assigned a low relative total impact value.



### Set Net Fishery

Potential adverse impacts to the commercial set net fisheries near the port sites were evaluated primarily on the basis of interference with fish movements and existing set net sites caused by the supply barge unloading facility, the approach trestle, and coal vessel traffic.

The Ladd port site and supply barge unloading facility were judged to have a significantly greater potential for impact upon set net sites since they are located in the midst of one of the most productive set netting areas in upper Cook Inlet. The Granite Point site would also impact some set net sites, but to a lesser extent. Both the northern/Ladd and eastern/Ladd alternatives were thus assigned a high relative total impact value while the southern/Granite Point alternative was assigned a moderate value.

### Subsistence

Potential subsistence impacts were evaluated primarily on the basis of: 1) effects on access to, and use of, traditional use areas; 2) changes in fish and wildlife abundance; 3) interference with fish and wildlife cycles or movements; 4) increased nonresident harvest of subsistence resources; and 5) the possibility of increasingly restrictive harvest regulations.

The southern/Granite Point alternative was judged to have a significantly greater potential for impacts to subsistence since the lower corridor and port site would be in areas traditionally used for subsistence by residents of Tyonek while the other two alternatives are located in areas with no significant subsistence use. Also, the southern/Granite Point alternative would open access to the Chuitna River to impacts on subsistence fish species. Therefore, the southern/Granite Point alternative was judged to have a high relative total impact while the northern/Ladd and eastern/Ladd alternatives were judged to have low values.

### Socioeconomics

No significant differences in socioeconomic impacts to Anchorage or the Kenai Peninsula were identified among the three alternatives. Potential socioeconomic impacts to Tyonek were evaluated primarily on the basis of effects upon: 1) local employment, 2) community population and infrastructure, and 3) social and cultural values.

No significant differences were identified among the three alternatives for local employment since Tyonek is connected to the southern/Granite Point alternative by the existing road system and a small vehicle bridge would be built across the lower Chuitna River to provide access to either

of the two other alternatives. The social and cultural impacts to residents of Tyonek would be similar for any of the three alternatives. If the eastern/Ladd alternative were selected, however, it could give Tyonek a significantly greater degree of control over the project and would increase the applicant's accountability to the community. Tyonek would also receive revenue from the transportation corridor right-of-way lease. Therefore, the eastern/Ladd alternative was assigned a low relative total impact value while the southern/Granite Point and northern/ Ladd alternatives were assigned moderate values.

#### Resional Use

Potential impacts to regional use were evaluated primarily on the basis of consolidation with existing facilities, potential for other regional uses, and component size, location, and adequacy for expansion.

The southern/Granite Point alternative would be closer than the other two alternatives to areas most likely to be developed in the future (e.g., the Placer U.S. Center Ridge coal deposit west of the Diamond Chuitna project area). This could have a positive effect upon the feasibility of some potential developments since a crossing of the Chuitna River would not be required to reach the port site as would be necessary with either the northern/Ladd or eastern/Ladd alternative.

The southern/Granite Point alternative would also consolidate with the existing road system and facilities in the Granite Point area while the other alternatives would not consolidate with existing facilities to the same extent. This, however, was not judged to be significant.

The southern/Granite Point alternative would be constructed entirely on public land and the port site would have ample room for expansion, thus likely making the corridor and port site available to other potential users. The northern and eastern corridors, however, would cross some private lands which may not be available to future users. Also, while the port site at Ladd is public land, the amount of public land is not as large as at Granite Point, possibly precluding expansion to accommodate other users and requiring development of another port.

In the final analysis, the southern/Granite Point alternative was judged to have a low relative total impact value while the northern/Ladd and eastern/Ladd alternatives were judged to have moderate values.

### Technical Complexity

Potential technical complexity impacts were evaluated primarily on the basis of the availability of adequate technology and the relative complexity of design, construction, and operation. Adequate technology presently exists to design, construct, and operate all three alternatives. Both port sites have shoals offshore which would need to be considered in navigating ships during operations. This was not considered a significant cause for concern in either situation. Therefore, all three alternatives were assigned a low relative total impact value.

### cost

No comparative cost data for any of the three alternatives were made available by the applicant. Therefore, no relative total impact values have been assigned for this criterion.

### 3.2.5 Identification of Preferred Alternative

The comparison of alternatives process described above assigned relative total impact values to the three action alternatives for each of the ten evaluation criteria (Table 3-9). It should be remembered that when using relative total impact values, the lower the value the better, i.e., a lower value equates with a lower potential for adverse impact. Inspection of Table 3-9 shows that for the nine evaluation criteria for which data were available, seven showed significant differences among the three alternatives: water quality, fish, wildlife, set net fishery, subsistence, socioeconomics, and regional use.

The eastern/Ladd alternative clearly had the lowest overall relative total impact value. For five of the seven criteria showing a significant difference among the alternatives, it received a low rating. Only for the set net fishery criterion did it receive a high rating.

While impacts to set netters from a port site at Ladd could be significant, proper scheduling and operational management at the port site would likely substantially reduce or eliminate significant impacts to the fishery. Such impacts probably would not occur from coal loading operations at full production which would take place at the end of the trestle over 3 km (1.8 mi) from shore, but rather from the supply barge staging area on the beach adjacent to the trestle. Since the set net sites are used only during the fishing season, and then only on certain days of the week, proper scheduling of incoming supply barges to avoid fishing openings and to accommodate local fishermen's traditional uses could likely avoid serious impacts.

On the basis of its having the least overall relative total impact value and the capability of substantially reducing or eliminating significant impacts to the lone criterion (set net fishery) for which it received a high rating, the **eastern/Ladd** alternative was identified as the preferred alternative.

Whether the applicant could develop an eastern corridor, however, is not certain. The corridor would cross private land owned by TNC and to date, the applicant and TNC have been unable to negotiate a right-of-way agreement.

The **southern/Granite Point** and **northern/Ladd** alternatives showed significant differences in potential impacts for four criteria: wildlife, set net fishery, subsistence, and regional use (Table 3-9). The potential exists for significantly greater impacts to the set net fishery for the **northern/Ladd** alternative and the **eastern/Ladd** alternative. Proper scheduling and operational management, however, would substantially reduce or eliminate such impacts.

The differences for the wildlife criterion were considered significant. The **northern/Ladd** alternative would have greater adverse quantitative and qualitative habitat impacts for brown bear that could not be mitigated to eliminate those differences.

For the subsistence criterion, the **southern/Granite Point** alternative would have significantly greater adverse impacts that could not be mitigated to eliminate the differences. The **northern/Ladd** alternative would have very limited impact on subsistence values while the southern/ Granite Point alternative would be built through a significant traditional use area.

From the regional use perspective, the low potential for adverse impacts for the **southern/Granite Point** alternative was considered a significant benefit. The size of the area available for the port site at Granite Point as well as its geographic location with respect to likely future developments and the southern **corridor's** location entirely on public land were considered to be significantly better than for the **northern/Ladd** alternative.

Thus the lower potential for adverse impacts from the **southern/Granite Point** alternative for the set net fishery, wildlife and regional use criteria were countered by the higher potential for impacts for the subsistence criterion. Therefore, on an overall basis the **southern/Granite Point** alternative was judged to have a lower potential for adverse impacts than did the **northern/Ladd** alternative. Although the preponderance of higher potential for adverse impacts to the evaluation criteria from this comparison were attributed to the **northern/Ladd** alternative, the potential effects upon

local residents from the higher impacts to subsistence from the southern/Granite Point alternative were not lightly dismissed. Thus, while the overall potential for adverse impacts was judged higher for the northern/Ladd alternative, it was not a clear cut difference.

### 3.2.6 Comparison of Housing/Airstrip Options

The three alternatives compared above all used the Lone Creek site as the option for the housing and airstrip components. Two other options were identified for those components and are compared below to the Lone Creek site. These are the Congahbuna and Threemile sites. The purpose of this comparison was to determine whether either site provided a significant advantage over the Lone Creek site such that it could be substituted for the Lone Creek option in one or more of the alternatives.

The differences in impacts to the evaluation criteria among all three housing/airstrip sites are described below. For each criterion, the basis for the evaluations were the same as those used above in comparing the three alternatives (e.g., spill risk and sediment production for water quality, direct and indirect habitat loss for wildlife, etc.). The relative total impact values assigned to a criterion for each housing/airstrip option are shown in Table 3-10.

#### Water Quality

No significant differences in potential water quality impacts were identified for any of the three options. Therefore, each was assigned a low relative total impact value.

#### Fish

The Congahbuna site would have a lower impact than Lone Creek since it is located at least 3.2 km (2 mi) from the Chuitna River, thus making it more difficult for workers to fish. The Threemile site would have a greater impact than Lone Creek as its location would permit access to several lakes or streams with fish. Thus, the Congahbuna site was judged to have a low relative total impact value while the Lone Creek and Threemile sites were judged to have values of moderate and high, respectively.

Table 3-10

EVALUATION CRITERIA MATRIX SHOWING RELATIVE TOTAL IMPACT  
VALUES ASSIGNED TO THE THREE HOUSING OPTIONS

| Evaluation<br>Criteria      | Lone Creek | Congahbuna | Threemile |
|-----------------------------|------------|------------|-----------|
| 1. H <sub>2</sub> O Quality | Low        | Low        | Low       |
| 2. Fish                     | Moderate   | Low        | High      |
| 3. Wildlife                 | Low        | Moderate   | Moderate  |
| 4. Reclamation              | Low        | Low        | Low       |
| 5. Set Net                  | Low        | Low        | Low       |
| 6. Subsistence              | Moderate   | High       | Low       |
| 7. Socioeconomic            | Low        | Low        | Low       |
| 8. Regional Use             | Low        | Low        | Low       |
| 9. Technical Complexity     | Low        | Low        | Low       |
| 10. cost                    | No Data    | No Data    | No Data   |

### Wildlife

Both the Congahbuna and Threemile sites would have a greater impact upon waterfowl and swans than would the Lone Creek site as they would be located close to areas used by waterfowl and swans for breeding, resting, and some migration. Therefore, the Lone Creek site was assigned a low relative total impact value while the Congahbuna and Threemile sites were assigned moderate values.

### Reclamation

Technology for successful reclamation of the housing and airstrip facilities at any of the three sites exists and has been demonstrated to be effective for other Alaska projects. Therefore, each of the sites was assigned a low relative total impact value.

### Set Net Fishery

No significant differences in potential impacts to the set net fishery were identified for any of the sites. Therefore, each of the sites was assigned a low relative total impact value.

### Subsistence

The Congahbuna site would have potential for significantly greater impacts to subsistence than the Lone Creek site as it would be located in an area of traditional subsistence use. The Threemile site would have somewhat lower potential for impact than the Lone Creek site since it would be well removed from areas of traditional subsistence use. Thus, the Congahbuna option was assigned a high relative total impact value while the Lone Creek and Threemile options were assigned moderate and low values, respectively.

### Socioeconomics

Both the Congahbuna and Threemile options would have somewhat less potential impact than the Lone Creek option since there would be less fishing in the Chuitna River by workers and the local fishing guides would not have as much competition for fish. This, however, was not considered to be a significant difference. Therefore, all three options were assigned low relative total impact values.

### Reaional Use

Future developments (e.g., coal) would be most likely to take place to the northwest of the Diamond Chuitna project area. The Congahbuna housing and airstrip site would be closer to these potential development sites than would be either Lone Creek or Threemile. Closer inspection,

however, shows that its distance from potential developments is great enough that the site would not likely be used by other developments in the region and thus any advantage over the Lone Creek site probably would be negligible. Thus, all three sites were judged to have a low relative total impact value.

#### Technical Complexity

Adequate technology presently exists to design, construct, and operate all three options. Therefore, all three options were assigned a low relative total impact value.

#### Cost

No comparative cost data for any of the three options were made available by the applicant. Therefore, no relative total impact values have been assigned for this criterion.

#### Identification of Preferred Housing/Airstrip Option

The results of the comparison of housing/airstrip options described above are shown in Table 3-10. There were few significant differences among the three options. For six of the nine criteria for which data were available, all three options showed uniformly low relative total impact values. For the three criteria for which significant differences existed (fish, wildlife, and subsistence), both the Congahbuna and Threemile options received alternately higher and lower values than the Lone Creek option such that neither emerged as having an overall significantly lower potential for adverse impacts than the Lone Creek option. For example, the Congahbuna option was judged to have values of low and high, respectively, for the fish and subsistence criteria while the Threemile option received values of high and low, respectively, for the same criteria. The Lone Creek option received moderate values for both criteria.

In final analysis, therefore, there was no basis for substituting either the Congahbuna or Threemile housing/airstrip options for the **applicant's** preferred option at Lone Creek in any of the three alternatives.

### 3.3 ALTERNATIVES AVAILABLE TO THE AGENCIES

There are three alternatives available to EPA, the Corps, DNR, and other state and local agencies through each **agency's** permitting responsibilities. They can: 1) issue permits as proposed with standard stipulations, 2) deny the permits, or 3) issue the permits with stipulations tailored to this project which address specific impacts. Generally, the third alternative is preferable because it allows the project to proceed while minimizing the unavoidable adverse impacts.



Although it is not the purpose of this EIS to decide what stipulations the agencies should impose, it is appropriate to review the relative advantages and effectiveness of the various mitigation options which agencies may require as permit stipulations. The major mitigation options available to the agencies are discussed in Chapter 6.0.

### 3.4 NO ACTION ALTERNATIVE

The No Action Alternative means that development of the Diamond Chuitna project would not occur. This alternative may be used as a baseline to which the action alternatives can be compared.

The No Action Alternative would result from denial of one or more federal or state permits necessary for project development or a decision by the applicant not to undertake the project.